



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/700,143	11/09/2000	Udo Bub	P00,1797	1920
29177	7590	07/28/2004	EXAMINER	
BELL, BOYD & LLOYD, LLC P. O. BOX 1135 CHICAGO, IL 60690-1135			LEWIS, MICHAEL A	
			ART UNIT	PAPER NUMBER
			2655	#11

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/700,143

Applicant(s)

BUB ET AL.

Examiner

Michael A Lewis

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on 14 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7,9-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7,9-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/14/04 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

#### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a) because it fails to show all details in feature extraction such as windowing operation as discussed in specifications. Also, details as described in the specification related to the splitting algorithm should either be included in the drawing or shown in a new detail drawing. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawings are required in reply to the Office action to avoid abandonment of the application. The examiner approves the proposed drawing correction filed 5/14/04. The objection to the drawings will not be held in abeyance.

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 2655

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1,4,5,7,9 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al. (IEEE ICASSP'92), et al. in view of Hwang et al. (U.S. Patent 6141641) and further in view of Bub et al. (WO 98/11534)(See US6460017 for English version).

As per Claims 1 & 7, Takami et al. disclose the use of a speech recognition system *[also executed on a processor or computer]* that

- a. Digitalizes a voice signal (Col 6, pg 575)
- b. Extracts features (Col 6, pg 575)
- c. Uses imaging of features in an acoustical model that utilizes HMM as a basis to model speech (Col 6, pg 575)
- d. A global search that produces a recognized word sequence (Col 6, pg 575).

Takami et al. show items a, b, c and d, but do not show the modifying codebook based on the use of entropy as a measure for splitting the probability density function. However, Hwang et al. teach the modification of the codebook based on the use of entropy as a measure (Col8, lines29 - 40). Entropy gives the uncertainty in a prediction of a statistical event. Hwang et al. use it to determine the likelihood of generating data aligned to an output distribution (Col 10, lines 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to modify Takami et al. with the use of entropy for the splitting of the probability density function as taught by Hwang et al. in order to efficiently provide new regions in the feature space that provided improved speech recognition.

The combination of Takami et al. and Hwang do not teach that the adaptation is dynamically performed at run time. However, Bub et al. discloses a dynamic adaptation process for previously recognized words that utilizes an adaptation

factor for adjusting the HMM Codebook during an on-line operation (Col 4, Lines 21 – 31).

Therefore it would have been obvious to one of ordinary skill at the time of the inventions to modify the combination of Takami et al. and Hwang with the use of dynamic adaptation as taught by Bub et al. for a online speech recognition since it would have contributed to a more robust and efficient speech recognition system.

Regarding claim 4, the modified Takami et al. show the use of a 2-mixture gaussian probability function (Col1, pg 574).

Regarding Claims 5, the modified Takami et al. show splitting of states of a probability functions by the use of entropy. The concept of splitting the probability density functions or modes by the approximation, where for a large number of random samples, the standard deviations are equal and the means are different is logical. The standard deviation of the probability density functions is not expected to change significantly since the scatter conditions is not expected to change significantly between modes. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made not to equate the mean since it is the only way to distinguish new modes.

Regarding Claim 9, the main purpose of the modified Takami et al. algorithm is the determination of the model architecture and parameters simultaneously. This algorithm will improve on the speed and efficiency of a speech recognition system and give a faster execution time.

Regarding Claim 11, the modified Takami et al. disclose a successive state splitting algorithm (pg 574, Col1).

7. Claims 3 & 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takami et al. (IEEE ICASSP'92) in view of Hwang et al. (U.S. Patent 6141641) and in view of Bub et al. (WO 98/11534)(See US6460017 for English version) as applied to claim 1 or 7 above, and further in view of Phillip et al (U.S. Patent 6501833).

Regarding Claim 3, the modified Takami et al. show the use of splitting of the probability density functions by the use of entropy as a means of training/updating codebooks. The modified Takami et al. do not show the modification of a large vocabulary by the dynamic addition of new words. However, Phillips et al. teach "The speech recognition system for dynamically adding words to an active portion of a total vocabulary ... ", (Col 14, lines 5 – 45). The adaptive or dynamic capability of a speech recognition system gives the advantages of the rapid and efficient addition of new words to a system's active vocabulary.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify the modified Takami et al. with the dynamic addition of new words to create a large vocabulary as taught by Phillips in order to develop an online speech recognition application.

Regarding Claim 10, the modified Takami et al. show the use of splitting of the probability density functions by the use of entropy as a means of training/updating codebooks. The modified Takami et al. do not teach a method of adapting to a speaker pronunciation. However, Phillips et al. teach "A method for producing a word pronunciation network ... a pre-established active vocabulary...word is selected from a base form pronunciation ....." (Col4, line 54 - Col15, line 65). The adaptive or dynamic capability of a speech recognition system gives the advantages of the rapid and efficient addition of new speaker pronunciations to a system's active vocabulary.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify the modified Takami et al. by the splitting of the probability density functions for 'online' adaptation as taught by Phillips et al. in order to develop a dynamic speech recognition system.

***Response to Arguments***

8. Applicant's arguments filed 5/14/04 have been fully considered but they are not persuasive. The applicant cites that Phillips (US6501833) discloses that a speech recognition system for dynamically adding words to an active portion of a total vocabulary (Abstract; Col 14, lines 5 – 45). The office agrees with the applicant that the speaker adaptation described in the applicant's invention and reference is different. The applicant's invention is directed towards speaker adaptation on an acoustic level as described and not just a dynamic system for adding words. However, Bub et al. (WO 98/11534) discloses a dynamic adaptation process for previously recognized words that utilizes an adaptation factor for adjusting the HMM Codebook during an on-line operation (Col 4, Lines 21 – 31).
9. Applicant's arguments with respect to claims 1,3-5,7 & 9-11 have been considered but are moot in view of the new ground(s) of rejection.

**Conclusion**

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lewis A Michael whose telephone number is 703 505-8730. The examiner can normally be reached on Monday through Friday, 8:30 am – 5 pm.

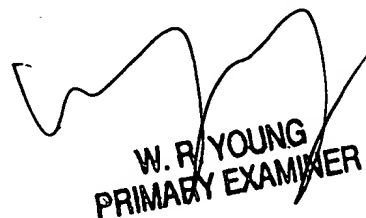
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, To Doris can be reached on (703)305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lewis A Michael  
Examiner  
Art Unit 2655

Mal

7/25/2004

  
W. R. YOUNG  
PRIMARY EXAMINER